

## CLAIMS

We claim:

1. A process for the fracture separation, into a cap and a rod, of an integrally formed connecting rod having a bore therein along a predetermined fracture plane, the process comprising:
  - a) fixing a part of the connecting rod that intended to become the rod, selectively, over a stationary lower jaw, a part of the connecting rod that intended to become the cap, selectively, over an upper jaw movable along a straight line perpendicular to the predetermined fracture plane,
  - b) applying two harmonic forces to two sides of the connecting rod, where at any time instant, the two harmonic forces are equal in magnitude, opposite in direction, and act along a straight line that is substantially parallel to the predetermined fracture plane and perpendicular to the axis of the bore cylindrical surface, said applying being accomplished by urging two contacts against the two sides, and
  - c) applying a dynamic force, by urging the upper jaw away from the lower jaw to thereby fracture the connecting rod into said cap and rod.
2. A process as claimed in claim 1, wherein step b) is preceded by applying a pre-stressing force to the upper jaw, urging said upper jaw away from the lower jaw and thereby pre-stressing the connecting rod.
3. A process as claimed in claim 1, wherein step b) is preceded by applying two pre-stressing forces to the two sides of the connecting rod, where the two pre-stressing forces are equal in magnitude, opposite in direction, and act along a straight line that is substantially parallel to the predetermined fracture plane and perpendicular to the bore axis, said applying being accomplished by urging the two contacts against the two sides.
4. A process as claimed in claim 1, wherein step b) is preceded by :
  - a) applying a pre-stressing force to the upper jaw, urging said upper jaw away from the lower jaw and thereby pre-stressing the connecting rod, and
  - b) applying two pre-stressing forces to the two sides of the connecting rod, where the two pre-stressing forces are equal in magnitude, opposite in direction, and

act along a straight line that is substantially parallel to the predetermined fracture plane and perpendicular to the bore axis, said applying being accomplished by urging the two contacts against the two sides.

5. A process as claimed in any one of claims 1 to 4, wherein the frequency of the harmonic forces is substantially the same as a selected natural frequency of a structural system that idealizes the connecting rod with all movements and rotations constraints imposed on said connecting rod during the fracturing process, said selected natural frequency is the natural frequency associated with a natural vibration mode that has substantially the same configuration of the characterizing deformed shape of said structural system under the effect of the harmonic forces.
6. A process as claimed in any one of claims 1 to 5, wherein said dynamic force is applied during a time period centered on a time instant at which the deformed shape of the connecting rod is the closest to its original shape.
7. A process as claimed in any one of claims 1 to 5, wherein said dynamic force is an impulsive force applied substantially at a time instant at which the deformed shape of the connecting rod is the closest to its original shape.
8. A process as claimed in any one of claims 1 to 5, wherein said dynamic force is applied during a time period centered on a time instant at which the stress intensity factor corresponding to the harmonic forces has a maximum value.
9. A process as claimed in any one of claims 1 to 5, wherein said dynamic force is an impulsive force applied substantially at a time instant at which the stress intensity factor corresponding to the harmonic forces has a maximum value.